Understanding the Paradox of Information Systems (IS) Case Studies

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ABSTRACT

This research aims to understand the mediating roles of learning engagement, learning process, learning experience and their impacts towards students' learning outcomes through case study pedagogy. Using data collected from the 2013 cohort of Information Systems (IS) classes at RMIT University Vietnam, findings were based on students' responses to survey items on whether localized real case studies have positive influence on student engagement (in skill, emotional, participation, and performance), learning process (students' approach on knowledge), and learning experience (students' opinion on feedback from classmates and lecturer). The research further explored how these mediators affect students' learning outcomes in group performance and individual's perceptions of group learning. Structural equation modeling was used to test the causal model. Analysis revealed that case knowledge and case perception had positive influences on students' skill and emotional engagement. However, only case knowledge had a positive impact on the functions of feedback.

Keywords

Mediating Role, Learning Engagement, Learning Process, Learning Experience, Learning Outcomes, Localised Real Case Studies.

INTRODUCTION

Developing a better understanding of case study method in undergraduate-level education has been identified as an important issue in Management Information Systems disciplines (Webb, Gill, and Poe, 2005). Case study pedagogy exposes students to real-life situations of business cases through a comprehensive interaction among students and their instructors (Barnes, Christensen, and Hansen, 1994). Moreover, class discussions based on case studies enable students to be proficient in communication, self-management, decision-making and problem-solving skills (Sawyer, Tomlinson, and Maples, 2000).

The effectiveness of the case method depends on how students engage with the case and how instructors assist and debrief class discussion (Wassermann, 1994). In case study pedagogy, instructors must focus on leading and facilitating discussions (Webb et al., 2005) rather than providing information. The instructor must raise discursive questions that generate cognitive dissonance and, therefore, encourage the students to think critically (Wassermann, 1994). An effective case instructor should also instruct students to conduct a framework of relevant information from the case data that gives sharp views on related issues in the future job (Rangan, 1995). Prince and Felder (2006) stated that case-based learning requires teaching techniques that contribute to students' inductive learning. The instructors must listen and always encourage student's opinions. Chronically, case discussions can increase conceptual understanding and higher-order thinking skills (Sudzina and Kilbane, 1994) because case-based teaching and discussion can provide learner opportunities for collaboration and reflection (McNergney, Herbert, and Ford, 1994).

The execution of a research project, which investigates the impacts of localized real case studies on student engagement (in skill, emotional, participation, and performance), learning process (students' approach on knowledge), and learning experience (students' opinion on feedback from classmates and lecturer) are documented in this paper. Moreover, the mediating roles of student engagement, learning process and learning experience to learning outcomes will also be examined.

LITERATURE REVIEW

In this modern economy, the knowledge and skill of graduates heavily affect an individual's employment prospects as well as country's competitiveness as a whole (Association of American Colleges and Universities, 2007). Colleges and universities need to design and lead in some practical pedagogy that can enhance students' learning outcomes (Hu and Kuh, 2003). Case study is considered as constructive pedagogy, which improves in-depth coverage and synthesis of theory and student's involvement (Sudzina, 1997). A multimedia case-study environment also enhances students' confidence in their knowledge and stimulates their curiosity by illustrating the application of theories in real situations (Wolter, Lundeberg, Bergland, Klyczek, Tosado, Toro, and White, 2012).

Webb's findings (2005) showed that case method pedagogy applying to technology mediated learning enhanced learning outcomes. In his research, the knowledge and perceptions of the appointed case acquired by students were scored (Webb et al., 2005). Case knowledge was measured through questions to determine how the students induced course concepts while case perceptions were determined by the degree to which student felt a case influenced their understanding of a course.

Student engagement is believed to have an important relationship with learning outcomes as it contributes to learning stimulus and achievement. Four dimensions of student engagement were explored and built in the student course engagement questionnaire (Handelsman, Briggs, Sullivan, and Towler, 2005), which included skills engagement, participation/interaction engagement, emotional engagement, and performance engagement. Understanding level and type of student engagement is helpful for instructor to inspire students in class.

With the same student course engagement questionnaire (SCEQ), various experiences of students had different levels of engagement. Students involving in undergraduate research and internships were more engaging than those involving in service learning and learning communities (Miller, Rycek, and Fritson, 2011). This shows that active participation contributed to student engagement (Kuh, Pace, and Vesper, 1997). In addition, identification of long-term career plan was found to increase student engagement (Shernoff, Csikzentmihalyi, Schneider, and Shernoff, 2003).

An active learning approach assists students in applying knowledge from theory and making independent decisions in practice, (Sudzina, 1997). The two-factor structure was revised to evaluate teaching and learning approaches of students (Biggs, Kember, and Leung, 2001). For a surface approach to learning, students only memorize important points and write it down in a test while for a deep approach, students are required to apply knowledge learnt to solve the problems. In fact, most undergraduate students use surface approach instead of deep approach in their learning (Biggs, 1987a; Gow and Kember, 1990). Nevertheless, other studies showed that using problem-based learning, both graduate students and undergraduate students could achieve higher learning approach (Newble and Clarke, 1986).

The significant relationship between the study process questionnaire (SPQ) and learning outcomes was tested by previous studies. Several studies showed that SPQ had no relationship with the academic achievement of second-year students of a medical school (Groves, 2005) and of second-year law students (Gijbels, Van de Watering, Dochy, and Van den Bossche, 2005). On the other hand, other studies found that students' surface approach to learning had weak and negative correlation with academic achievement of first-year accounting students (Ramburuth and Mladenovic, 2004) and of nursing students (Snelgrove and Slater, 2003). In contrast, deep approach to learning had strong and positive relationship with academic achievement in longitudinal study (Zeegers, 1999).

Feedback helped improving students' understanding and therefore is viewed as a central of learning experience (Rowe, 2011). Moreover, Rowe and Wood (2008) found that students who preferred surface approach to learning regard feedback as specific answers for meeting minimum requirements, while those who preferred deep approach perceive feedback as the way to enhance their understanding of the course. Hence, the value and effectiveness of feedback such as the timing of feedback (Rucker and Thomson, 2003) have a crucial role in course structure.

Previous studies by Värlander (2008), and Rowe (2011) found that seven different functions of feedback, not only was a mean of learning improvement, but also played an emotional role in students' social needs that affected students' achievement.

Learning outcomes were determined by the effort of student during the learning process (Hu and Kuh, 2003; Pascarella and Terenzini, 1991, 2005). The National Survey of Student Engagement (NSSE, 2004, 2005) indicated that learning engagement played an important role in learning outcomes in higher education. Two previous prominent approaches were used to measure students' learning outcomes, which were self-reported gain from NSSE, and psychometrically tested and validated instruments (Arum and Roksa, 2011).

For assessment of case study courses, General Support System (GSS) model for group learning research presented a way to collect valuable information on both group and individual outcomes (Mennecke, Hoffer, and Wynne, 1992). Case study

involves interaction between instructors and students. It provides a situational context experienced by individuals in a group. Effects of group-based case study courses on group performance include 11 domains while individual's positive perceptions of group learning consist of 8 domains (Peterson and Quarstein, 2001). The GSS model is more objective than student-based assessment because it measures students' learning outcomes on both group performance and individual's positive perceptions.

In the context of case study pedagogy influencing on learning outcomes, mediation of learning engagement, learning process and learning experience are used to test their roles in this study. Learning engagement is used to determine the extent to which each engagement form is promoted by different learning experiences (Miller et al., 2011). The study process questionnaire is used to explore students' approaches to learning (Choy, O'Grady, and Rotgans, 2012).

This research will combine different measuring approaches to determine how learning engagement, learning processes and learning experience positively contribute to students' learning outcomes through the use of localized real-life case studies.

DATA AND METHOD

To collect data for this study, students were encouraged to answer a web-based questionnaire at the end of the case discussion. Participation was voluntary, anonymous, and unrelated to their assessment grades. The questionnaire was sent to 500 undergraduate students studying the Business Information Systems Professionals and Internet for Business courses. There were about 400 valid questionnaires and the effective response rate was approximately 80 per cent.

The survey questions were designed for case discussion classes. In part A, questions were used to examine case knowledge and case perceptions over case discussion (Webb et al., 2005). At first, students were required to score course concepts related to the case discussed in class. Students were then requested to assess their perceptions of the case that impact on their thinking about the course. Both sections were developed from a scoring scheme through discussion questions of the cases.

Student course engagement questionnaire (SCEQ) was revised from an original 27-item instrument to a 23-item instrument (Handelsman et al., 2005). This set of measuring scale assesses student engagement on four separate dimensions including skills engagement, emotional engagement, participant/interaction engagement, and performance engagement. Firstly, the skill engagement consisting of nine items represents student engagement with practicing skills. The following factor expressed by five items is labeled emotional engagement with the class materials. The third element is participation/interaction engagement with six items depicting participation in class and interaction with instructor and peers. The final dimension represents three items that expose the level of performance in class.

The earlier study process questionnaire (SPQ) (Biggs, 1987a, 1987b) was developed with three approach scores including surface, deep, and achieving, sequentially. The original 43-item SPQ was reduced to a revised two-factor version (R-SPQ-2F) with 10 items per approach score (Biggs et al., 2001). The final version of the SPQ had two main approaches, deep approach (DA) and surface approach (SA), which can be used to evaluate the learning environment in classrooms. The two main factors consisted of compatible motive and strategy components. This revised two-factor version is believed to ideally assess a particular course with other contextual elements in the teaching and learning system.

The importance of feedback to students' learning experiences was classified in seven themes (Rowe, 2011). Feedback was (1) a guide towards good results, (2) a learning tool that helped students understanding the course materials better, (3) a mean of interaction and participation in the learning process, (4) a learning motivation and encouragement, (5) an emotion regulator and a mean of reducing anxiety, (6) an expression of respect, and (7) an expression of caring for personal contact in learning.

The general support system (GSS) model for group learning (Mennecke et al., 1992) was applied to assess students' learning outcomes on both individual and group performance. The assessment items were divided into two subcategories (Peterson and Quarstein, 2001). One was the effect of group-based case study courses on group performance, which composed of 11 items and individual's positive perceptions of group learning with 8 items.

This study hypothesized that case study pedagogy would have positive effect on learning engagement, learning process, and learning experience, and, through those positive effects, students' learning outcomes would also be improved.

To determine whether learning engagement, learning process, and learning experience are capable mediators between case study pedagogy and learning outcomes, a means of structural equation modelling (SEM) was used to test a full and partial mediation model.

RESULTS

The causal model which included student course engagement, study process and feedback as mediators is depicted in Figure 1. The results suggested that the data matched the hypothesized model respectably, Chi-square/df ratio = 2.574, $p < .01$,

AGFI = .711, TLI = .689, CFI = .701, RMSEA = .056. For a large sample size, small differences between the implied sample covariance matrix and population covariance matrix will be statistically significant (Sharma, 1996). Consequently, researchers tend to turn to other methods to evaluate the fit of the model to the data instead of the $\chi 2$ statistic (Bearden, Sharma, and Teel, 1982). Regarding AGFI, researchers have commonly used a value of .08 as the cut-off point (Sharma, 1996). But analogous to $\chi 2$, AGFI tends to increase when sample size increases. The TLI and CFI are correspondingly used as relative fit indices less sensitive to sample size as .90 is cut-off value for TLI and CFI (Sharma, 1996). The RMSEA reveals how well the model with chosen parameter estimates would fit the population covariance matrix and its cut-off value in the range of .05 to .1 was considered fairly fit (MacCallum, Browne, and Sugawara, 1996).

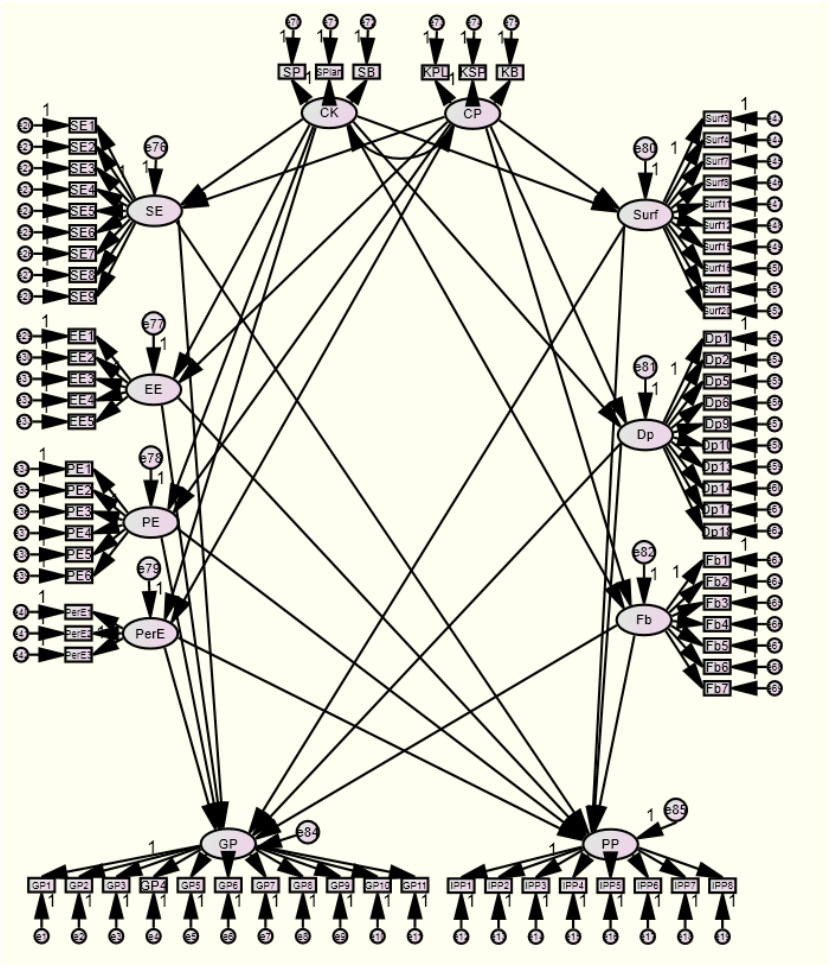

Figure 1 Paths representing relationships of variables

Four regression weights representing the relationships between case study method including case knowledge, case perception, and student engagement are presented in Table 1. Both case knowledge and case perception had significant and positive relationships with skill engagement and emotional engagement while their effects on participant engagement and performance engagement were insignificant. These relationships indicated that students were interested in practicing skills and involving emotionally with the case study method but were not active and collaborative in class discussions. In addition, the case study method did not enhance students' extrinsic motivation and performance.

Furthermore, Table 1 shows the relationships between student course engagement and learning outcomes. The findings were insignificant. Case study method did not help to promote their group performances and individual's positive perceptions of group learning. Since case study method did not have significant influence on participation engagement and performance goals, it led to the fact that there was a lack of attention on the right approach to studying a case. The results showed that engagement of participation and performance should be improved and that it is necessary to have an orientation on how to study using case method. In brief, the mediating role of student engagement is ineffective in this data set.

Causal relationships		Regression weight	P-value
Case knowledge	Skill engagement	.468	.034**
	Emotional engagement	.246	.089***
	Participant engagement	.146	.231
	Performance engagement	.125	.886
Case perception	Skill engagement	.455	.008***
	Emotional engagement	.445	.008***
	Participant engagement	.164	.165
	Performance engagement	.496	.412
Skill engagement	Group performance	.436	.180
Emotional engagement		-.270	.345
Participant engagement		.433	.402
Performance engagement		.034	.343
Skill engagement	Individual's positive perceptions of group learning	-.389	.913
Emotional engagement		.175	.913
Participant engagement		7.339	.291
Performance engagement		-.161	.566

The superscripts *, **, and *** denote significance at 10%, 5%, and 1% confidence level.

Table 1. Mediating Role of Student Course Engagement between Case Study Method and Learning Outcomes

The causal results of another mediator, study process, are depicted in Table 2. Case knowledge had a significantly inverse relationship with the deep approach to learning and had no significant relationship with the surface approach. Case study method requires discussion between students and instructor in class, hence the surface approach is not expected from students. In contrast, the inverse relationship between case knowledge and deep approach to learning indicated that students generally demonstrated little preparation for the case prior to class. A possible explanation of this relationship is how students perceived the approach to the case.

Case perceptions had a significantly obverse relationship with the surface approach to learning and a significantly reverse relationship with the deep approach. The obverse relationship demonstrated that the assigned case broadly impact the surface approach to comprehending of the case. Students did not discover that a case required their deep thinking about course

knowledge. Simultaneously, the inverse relationship showed that students did not fully understand the case study. The results showed the lack of instructions for students' perceptions of the case study method.

The surface approach had no relationships with the group performance and individual's positive perceptions of group learning. These insignificant relationships indicated that students who use the surface approach to learning did not engage in the learning activities and assessment. It seemed that surface approach was indeed a deficient mediator in the relationship between case study method and learning outcomes.

An unexpected finding was that deep approach to learning also had insignificant relation with learning outcomes. Ideally, in case study method, students are expected to keep a high level of attention and interest in learning to solve the problems. Deep approach to learning was supposed to be aligned with assessment and other contextual information in both teaching and learning. A possible explanation for this result is a lack of motive and strategy for a deep approach (Biggs, 1987a). The findings proved that the mediating role of the revised two-factor study process did not support this research model.

Causal relationships		Regression weight	P-value
Case knowledge	Surface approach to learning	.468	.034**
	Deep approach to learning	.246	.089***
Case perception	Surface approach to learning	.455	.008***
	Deep approach to learning	.445	.008***
Surface approach to learning	Group performance	.125	.200
Deep approach to learning		-.010	.727
Surface approach to learning	Individual's positive perceptions of group learning	-.210	.817
Deep approach to learning		.779	.120

The superscripts *, **, and *** denote significance at 10%, 5%, and 1% confidence level.

Table 2. Mediating Role of Study Process between Case Study Method and Learning Outcomes

The experimental results showed that case knowledge had a statistically positive relation with students' perception of feedback (Table 3). Course concepts related to the specific case made students recognize the value of feedback. The various effects of feedback were synthesized on student learning (Butler and Winne, 1995). Moreover, case perceptions had no relation with students' perceptions of feedback (Table 3). The case aiming to enhance students' knowledge did not affect students' learning issues and social needs. In short, students only concentrated on case knowledge rather than case perceptions in this study.

Analysis between perceptions of feedback and learning outcomes (Table 3) found insignificant results. It rejected the hypothesis that feedback would lead to better learning outcomes. Since case knowledge had a significantly positive association with perceptions of feedback from classmates and instructor, it determined that case discussion was a practical teaching method when feedback was used as a central element of learning experience. But the results showed that the mediating role of feedback between case study method and learning outcomes was not important.

Causal relationships		Regression weight	P-value
Case knowledge	Functions of feedback	1.101	.047*
Case perception		-.167	.496
Functions of feedback	Group performance	-.094	.455
	Individual's positive perceptions of group learning	.285	.803

The superscripts *, **, and *** denote significance at 10%, 5%, and 1% confidence level.

Table 3. Mediating Role of Functions of Feedback between Case Study Method and Learning Outcomes

DISCUSSION

Results demonstrated evidence of causal effect of case study method on skill engagement and emotional engagement. Emotional engagement is related to intrinsic outcomes of learning like holding an incremental theory about learning in class (Handelsman et al., 2005), which may be complementary to teaching knowledge and skills (Weinstein, Goetz, and Alexander, 1986). Participation engagement was related to internal and external indexes while the performance engagement involved with achieving extrinsic rewards with grading scheme in class (Handelsman et al., 2005). Case study method could not motivate student performance engagement because discussions were not graded. Previous findings showed that extrinsic motivation was useful for new and extrinsically interesting materials (Sansone and Harackiewicz, 2000) but most of the assignments should be marked by instructors.

Collaborative learning is a crucial element in promoting student engagement (Tinto, 1997). Ideally, student engagement mediates the relationship between academic environments and learning outcomes, especially in enterprising disciplines (Pike, Smart, and Ethington, 2012). The findings of this study could not be used to infer that there are no causal relationships between case study method, student engagement, and learning outcomes. The data collection of this study was executed after case discussion. The problem was that students did not prepare for the case well prior to class. For the effective use of case method pedagogy, there are five principles including situational analysis, the imperatives of analysis and acting, student involvement, the non-traditional role of the instructor, and a balance of substantive and process teaching (Barnes et al., 1994). Another possible explanation is that the variables neglected in this study influenced case study method, levels of engagement, and learning outcomes and thus biased the results of research (Cellini, 2008).

The mediating role of study process between case study method and learning outcomes was the highlight of this research. Based on the empirical results, it was obvious that students' cognitive ability, one of the major determinants of academic achievement (Ackerman and Heggestad, 1997), could be dissonant. Among undergraduate students, there is a lower cognitive level of activities, which is not the intention of tertiary education (Gow and Kember, 1990). Constructive pedagogy suggested that learners should use their experience to actively construct self-owned understanding rather than to obtain them passively (Eggen and Kauchek, 1994). The novice students might have less experience in career and work to participate in the case discussion. Accordingly, instructors need to examine methods about teaching, course content, and goals to evaluate whether case method teaching is appropriate for course objectives and expectations (Sudzina, 1997) along with providing their own experience.

Two approaches to learning are relatively weak mediators between case study method and learning outcomes. The students' approaches to learning need to be interpreted in actual classroom behavior before they could be used as predictors of learning outcomes (Choy et al., 2012). Classroom behavior comprises of (1) student engagement in the learning process, (2) their engagement and persistence in self-directed learning, (3) their participation in group discussion and team work, and (4) their understanding of course knowledge and experience (Choy et al., 2012). The instructors need to observe and judge students' performance based on these four attributes. Previous studies have proven that a low score on both deep and surface approach to learning was quite typical of students who were new and had little experience in learning skills (Lindblom-Ylänne and Lonka, 1999). The absence of relationships between students' approaches to learning and outcome assessment is in line with works by Minbashian et al. (2004) and Gijbels et al. (2005). A possible explanation for the lack of learning process in

students could be that the content and method of teaching influenced students' approaches to learning and learning outcomes (Minbashian, Huon, and Bird, 2004). Trigwell et al. (Trigwell, Prosser, and Waterhouse, 1999) presented the empirical results that approaches to teaching were related to approaches to learning: teacher-centered approach to teaching was associated with surface approach to learning and student-centered approach to teaching was involved in deep approach to learning.

According to the findings, case knowledge had positive effects on peer feedback for building in-depth understanding. Providing feedback assisted case-based learning activities (Lee, Lee, Liu, Bonk, and Magjuka, 2009). Providing clear and consistent feedback can support students' learning (Tinto, 2003). Moreover, interaction and participation of students in class are essential for learning (Biesta, 2004). Previous studies supported that responses had a link between learning and motivation (Biggs and Tang, 2007). In this research model, case perceptions did not have any relations with functions of feedback even if the aim of case study method is that instructor can provide feedback to improve students' learning process and course content (Marcus, Taylor, and Ellis, 2004) as well as problem-solving skills (Fitzgerald, Hollingsead, Miller, Koury, Mitchem, and Tsai, 2007). A possible implication for this finding is that students' arrangement for small group discussion should be improved to bring out better case perceptions (Flynn and Klein, 2001) with instructor's careful design and assistance (Artan, 2007).

There was no significant result found between functions of feedback and learning outcomes. Students' comprehension and preference for feedback resulted in higher engagement, which was expected to have the positive influence on their learning outcomes (Rowe, Wood, and Petocz, 2008). A possible explanation for this inconsistent result could be the difference in the data-gathering methods because different methods can bring about different results (Zacharias, 2007). As there may be several solutions to a case, assessment can be in the form of a role-play for a reality check (Sudzina, 1997), or student perceptions of case learning method in which student-instructor and student-peer interaction were assessed (Webb et al., 2005). In addition, instructional issues such as planning, effective teaching method, and assessment also influence on learning outcomes (Eggen and Kauchek, 1994). Case competition in class can also make positive development when implementing within groups that have cooperation and interaction of case analysis and good research skills (Sudzina, 1994a, b, 1995, 1996). Furthermore, students' success depends on the learning environment in which they are taught and assessed with a method they know and understand (Biggs, 2003). Instructor should beware of students' mistakes, noticing whether they took the wrong way to complete a task and conducting a change in their approach for case study method.

CONCLUSION

The findings of this research can be meaningful in some dimensions and insignificant in others. The significant findings suggested that instructors might apply case method pedagogy for undergraduates to promote skill engagement, emotional engagement, and intensify interaction with students through giving feedback on case knowledge. But the data suggested that students' perceptions of case method pedagogy might even be enhanced if students understand how to conduct a case as well as work in groups. The most important lesson of this research is lack of guidance for students through the participation and performance scheme for a deep rather than surface approach to learning a case presented in this research. As noted at the outset, assessment of case study course had not been easy in the past and this is particularly true for course assessment in this study. The GSS model employed in this research appeared to be ineffectual as a means of learning outcomes regarding group performance, individual perception, and group development.

Although case-based learning has already been used widely for higher education, how to best utilize this method is an issue that must be studied and improved in the future. To implement expansive case-based learning, a creative design of instructional discussion and comprehensive facilitation are necessary (Garvey, O'Sullivan, and Blake, 2000). There are some recommendations for better designing of the case study method. Firstly, there needs to be detailed instruction regarding how to support student learning over the case-based course (Lee et al., 2009). Students do not have the needed skills and knowledge to learn and discuss in class. Correspondingly, detailed instruction and explicit grading system of case-based activities can support students in reducing cognitive dissonance and ambiguous in learning process. Secondly, cognitive ability and personality traits of students (Choy et al., 2012) should be examined for better predictions of learning outcomes. The complication of a case and the features of students of courses are the factors relating to their experience and ability to solve the problems. Accordingly, an appropriate scenario and in-class discussion time such as at the end of the semester will allow students to look at a case more thoroughly, having better understandings.

This study had some limitations. The participants were limited to students of the Business Information System Professionals and Internet for Business courses. Additionally, the virtual neglect of instruction and grading of students' actual behaviors in the classrooms may affect the results of this causal model. As a result, one should be cautious when implying the findings

and forwarding it to other programs of training. However, this experiment is at the beginning of promoting student engagement and learning experience by introducing case study method to the curriculum. Considering the results of these evaluations and their potential for improvement, the follow-up study can investigate academic achievements by observing the students' actual behaviors in the classroom (Choy et al., 2011) or examine a course first without and then with case study techniques for robust assessment (Peterson and Quarstein, 2001).

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